

SUPPORT FOR THE AMENDMENTS

The specification has been amended to recite a claim of priority to related International and Japanese patent applications. The specification has also been amended to address various informalities, including the Examiner's objection to the original abstract. Support for these amendments is found in the originally filed Application Data Sheet, as well as the specification and claims as originally filed.

Claims 2, 4, 6-10, 13, 14, 25 and 26 have been cancelled, claims 1, 5, 11, 12, 24, 27 and 28 have been amended, and new claims 31-34 have been added. Claims 5, 11, 12, 27 and 28 have been amended to place these claims in a better condition for allowance. Support for these claim amendments is provided by the originally filed claims and specification.

Support for the amendment to claims 1 and 24 is found at specification page 4, lines 20-37, page 5, lines 1-25, page 6, lines 9-32, page 7, lines 13-22, page 9, lines 1-13, page 16, lines 2-21, page 61, Table 1, Example 5, as well as original claims 1, 2, 4, 6, 24 and 26.

Support for newly added claims 31 and 32 is found at specification page 9, lines 1-13.

Support for newly added claims 33 and 34 is found at specification page 25, lines 27-37, and page 26, lines 15.

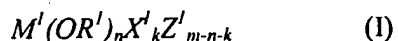
It is believed that these amendments have not resulted in the introduction of new matter.

REMARKS

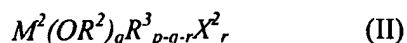
Claims 1, 3, 5, 11, 12, 15-24 and 27-34 are currently pending. Claims 2, 4, 6-10, 13, 14, 25 and 26 have been cancelled, claims 1, 5, 11, 12, 24, 27 and 28 have been amended, and new claims 31-34 have been added by the present amendment.

The rejections of: (1) claims 1-5, 7, 8, 11, 12, 15-17 and 21-30 under 35 U.S.C. § 102(b) as being anticipated over Hori (JP 2003-292713); and (2) claims 6, 9, 10, 13, 14, 18, 19 and 20 under 35 U.S.C. § 103(a) as being obvious over Hori in view of Yamamoto (JP 2002-326303), are respectfully traversed in part, and obviated by amendment in part, with respect to claims 1, 3, 5, 11, 12, 15-24 and 27-34.

Amended claim 1 recites a gas barrier layered product comprising a base material and a layer stacked on at least one surface of the base material, wherein the layer is formed of a composition comprising: *a hydrolyzed and condensed product of at least one compound (L) comprising a metal atom to which at least one characteristic group selected from a halogen atom and an alkoxy group has been bonded; and a neutralized product of a polymer comprising at least one functional group selected from a carboxyl group and a carboxylic anhydride group, wherein at least 55 mol% of a -COO- group contained in the at least one functional group has been neutralized with a metal ion having a valence of two or more,* wherein the compound (L) comprises at least one compound (A) represented by the following chemical formula (I) and at least one compound (B) represented by the following chemical formula (II):

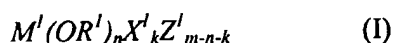


wherein M' is Si; R' is an alkyl group; X' is a halogen atom; Z' is an alkyl group substituted by a functional group having reactivity to a carboxyl group; m is equal to a valence of M' ; n is an integer of 0 to $(m-1)$; k is an integer of 0 to $(m-1)$; and $1 \leq n + k \leq (m-1)$,

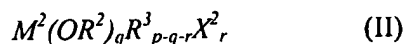


wherein M^2 is Si, Al or Ti; R^2 is an alkyl group; R^3 is an alkyl group, an aralkyl group, an aryl group, or an alkenyl group; X^2 is a halogen atom; p is equal to a valence of M^2 ; q is an integer of 0 to p ; r is an integer of 0 to p ; and $1 \leq q + r \leq p$, and wherein a mole ratio of the compound (A) / the compound (B) is in a range of 0.5 / 99.5 to 40 / 60.

Amended claim 24 recites a method for producing a gas barrier layered product, comprising: a first process of forming, on a base material, a layer composed of a composition comprising: a hydrolyzed and condensed product of at least one compound (L) comprising a metal atom to which at least one characteristic group selected from a halogen atom and an alkoxy group has been bonded; and a polymer comprising at least one functional group selected from a carboxyl group and a carboxylic anhydride group; and a second process of bringing the layer into contact with a solution comprising a metal ion with a valence of two or more, wherein at least 55 mol% of a $-COO-$ group contained in the at least one functional group is neutralized with the metal ion having a valence of two or more, wherein the compound (L) comprises at least one compound (A) represented by the following chemical formula (I) and at least one compound (B) represented by the following chemical formula (II):



wherein M^1 is Si; R^1 is an alkyl group; X^1 is a halogen atom; Z^1 is an alkyl group substituted by a functional group having reactivity to a carboxyl group; m is equal to a valence of M^1 ; n is an integer of 0 to $(m-1)$; k is an integer of 0 to $(m-1)$; and $1 \leq n + k \leq (m-1)$,



wherein M^2 is Si, Al or Ti; R^2 is an alkyl group; R^3 is an alkyl group, an aralkyl group, an aryl group, or an alkenyl group; X^2 is a halogen atom; p is equal to a valence of M^2 ; q is an integer of 0 to p ; r is an integer of 0 to p ; and $1 \leq q + r \leq p$, and wherein a mole ratio of the compound (A) / the compound (B) is in a range of 0.5 / 99.5 to 40 / 60.

Applicants have discovered that appearance, durability, tensile strength, elongation, and oxygen gas barrier properties of the gas barrier layered product under high humidity conditions and after retort processing are excellent when the hydrolyzed and condensed product of compound (L) comprises compound (A) and compound (B) in a mole ratio of 0.5 / 99.5 to 40 / 60, as presently claimed. Applicants have also discovered that the oxygen gas barrier property of a gas barrier layered product under high humidity conditions and after retort processing is *drastically improved* when at least 55 mol% of a –COO– group contained in the polymer has been neutralized with a metal ion having a valence of two or more, as presently claimed.

Hori and Yamamoto, when considered alone or in combination, fail to disclose or suggest the gas barrier layered product of the present invention, wherein the hydrolyzed and condensed product of compound (L) comprises compound (A) and compound (B) in a mole ratio of 0.5 / 99.5 to 40 / 60, and wherein at least 55 mol% of a –COO– group contained in the polymer has been neutralized with a metal ion having a valence of two or more, as presently claimed. As a result, these references fail to anticipate or render obvious the claimed invention.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). When a claim limitation is not explicitly set forth in a reference, evidence must make clear that the missing descriptive matter is necessarily present in the reference and that it would be so recognized by skilled artisans. *In re Omeprazole Patent Litigation*, 82 USPQ2d 1643 (Fed. Cir. 2007). The fact that a certain result or characteristic may occur or be present in the reference is not sufficient to establish inherency of that result or characteristic. *In re Rijckaert*, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). It is not sufficient if a material element or limitation is merely

probably or possibly present in the reference. *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 63 USPQ 1597 (Fed. Cir. 2002) and *In re Robertson*, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). To anticipate, the asserted inherent element must necessarily be present in the reference. *SmithKline Beecham Corp. v. Apotex Corp.*, 74 USPQ2d 1398 (Fed. Cir. 2005) and *In re Oelrich*, 212 USPQ 323, 326 (CCPA 1981). Anticipation cannot be predicated on mere conjecture respecting the characteristics of products that might result from the practice of processes described in cited references. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 220 USPQ 303, 314 (Fed. Cir. 1983).

As discussed in the present specification, the claimed hydrolyzed and condensed product of compound (L) may be produced by substituting the compound (L) with a hydroxyl group via hydrolysis, then condensing the hydrolyzed product (See e.g., page 7, lines 13-22). Hori fails to disclose or suggest the claimed hydrolyzed and condensed product of compound (L). As evidenced by the enclosed partial English translation, while Hori describes a *partial hydrolysate* of an organometallic compound, Hori fails to disclose or suggest *condensing* the hydrolysate of the organometallic compound (See e.g., [0015]).

Hori fails to disclose or suggest that the organometallic compound described therein comprises compound (A) and compound (B) in a mole ratio of 0.5 / 99.5 to 40 / 60, as presently claimed. Therefore, Hori necessarily fails to recognize that the appearance, durability, tensile strength, elongation, and oxygen gas barrier properties of a gas barrier layered product under high humidity conditions and after retort processing are excellent when the hydrolyzed and condensed product of compound (L) comprises compound (A) and compound (B) in a mole ratio of 0.5 / 99.5 to 40 / 60, as discussed in the present specification (See e.g., page 9, lines 1-13).

Hori fails to disclose or suggest that at least 55 mol% of a -COO- group contained in the polymer has been neutralized with a metal ion having a valence of two or more, as

presently claimed. A reference must be considered in its entirety (i.e., as a whole), including disclosures that teach away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 220 USPQ 303 (Fed. Cir. 1983). Hori teaches away from neutralizing at least 55 mol% of a –COO– group contained in the polymer with a metal ion having a valence of two or more, as presently claimed. Hori describes and exemplifies neutralizing 2-30 %, preferably 5-20 %, and more preferably 10 %, of the carboxyl groups present in the polycarboxylic acid polymer with a *monovalent* metal ion selected from *sodium, potassium and lithium* (See e.g., [0011]-[0013], [0035]). Moreover, Hori *explicitly teaches away* from neutralizing more than 30 % of the carboxyl groups present in the polycarboxylic acid polymer (See e.g., [0013]).

While Yamamoto describes a hydrolyzed condensate of an organosilicon compound (B), Yamamoto fails to compensate for the remaining above-identified deficiencies of Hori.

Accordingly, a skilled artisan would not have been motivated to arrive at the gas barrier layered product of the present invention, wherein the hydrolyzed and condensed product of compound (L) comprises compound (A) and compound (B) in a mole ratio of 0.5 / 99.5 to 40 / 60, and wherein at least 55 mol% of a –COO– group contained in the polymer has been neutralized with a metal ion having a valence of two or more, as presently claimed, based on the disclosures of Hori and Yamamoto, absent impermissible hindsight reconstruction, thereby precluding a prima facie case of unpatentability.

Assuming *arguendo* that sufficient motivation and guidance is considered to have been provided by Hori and/or Yamamoto to direct a skilled artisan to arrive at the claimed gas barrier layered product and corresponding method of producing the same, which is clearly not the case, such a case of obviousness is rebutted by a showing of superior properties and secondary considerations.

As discussed in the present specification, conventional gas barrier products suffer from an inferior oxygen gas barrier property under high humidity conditions and after retort processing (See e.g., page 2, lines 2-11 and 17-30). Based on the limited disclosures of Hori and Yamamoto, other skilled artisans have failed to discover a solution to this long-felt need.

As discussed in the present specification and shown by the comparative experimental data presented in Tables 1-4 therein, which are reproduced hereinbelow for the Examiner's convenience, Applicants have discovered that a superior oxygen gas barrier property under high humidity conditions and after retort processing is remarkably exhibited when *at least 55 mol%* of a -COO- group contained in the polymer of the gas barrier layered product has been *neutralized with a metal ion having a valence of two or more*, as presently claimed.

TABLE 1

Examples	Carboxylic	Added Polymer		Content of	Univalent Ion		Compound (A)				
	Acid-	Added		Inorganic	Added		Added		Polyvalent Ion		
	Containing	Added	Amount	Components	Ion	Amount	Compound(B)	Amount	Ion	Neutralization	
	Polymer	Polymer	[wt %]	[wt %]	Type	[mol %]	Type	Type	[mol %(*)]	Type	Degree
Example 1	PAA	—	—	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ²⁺	60
Example 2	PAA	—	—	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Mg ²⁺	64
Example 3	PAA	—	—	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Zn ²⁺	60
Example 4	PAA	—	—	30	—	—	TMOS	a-1	10	Ca ²⁺	63
Example 5	PAA	—	—	30	—	—	TMOS	a-1	20	Ca ²⁺	55
Example 6	PAA	—	—	8	—	—	—	a-1	100	Ca ²⁺	70
Example 7	PAA	—	—	20	—	—	TMOS	a-1	10	Ca ²⁺	67
Example 8	PAA	—	—	30	—	—	TMOS	a-2	10	Ca ²⁺	62
Example 9	PAA	PVA	3	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ²⁺	58
Example 10	PAA	Starch	3	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ²⁺	57
Example 11	PAA	—	—	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ²⁺	61
Example 12	PAA	—	—	30	—	—	TMOS	a-1	10	Ca ²⁺	5
Example 13	PAA	—	—	30	—	—	TMOS	a-1	10	Ca ²⁺	15
Comparative Example 1	PAA	—	—	30	—	—	TMOS	a-1	10	—	—
Comparative Example 2	PAA	—	—	0	—	—	—	—	—	Ca ²⁺	—

TABLE 2

Examples	Rate of Increase in Viscosity	Oxygen Transmission Rate			Oxygen Transmission Rate	Surface Appearance	Dropped Bag Breaking	Tensile Strength and Elongation	
	of Solution (S) (%)	(cm ³ /m ² · day · atm)			after Reton Processing		Strength (Times)	Strength (MPa)	Elongation (%)
		65% RH	85% RH	95% RH	(cm ³ /m ² · day · atm)				
Example 1	2	0.4	0.4	0.5	0.2>	AA	115	146	220
Example 2	2	0.4	0.4	0.5	0.2>	AA	117	146	200
Example 3	2	0.4	0.4	0.5	0.2>	AA	110	130	220
Example 4	0	0.2	0.2	0.2	0.2>	A	101	140	220
Example 5	0	0.5	0.5	0.6	0.2>	AA	94	120	180
Example 6	0	0.2	0.2	0.2	0.2>	AA	82	100	160
Example 7	0	0.4	0.4	0.5	0.2>	AA	96	120	170
Example 8	1	0.8	0.8	1.0	0.2>	A	98	140	200
Example 9	1	0.2	0.2	0.2	0.2>	AA	134	160	240
Example 10	1	0.2	0.2	0.2	0.2>	A	137	160	230
Example 11	2	0.7	0.7	0.8	0.2>	A	98	130	190
Example 12	2	35	45	68	60	A	121	140	200
Example 13	2	11	13	25	12	A	110	160	210
Comparative Example 1	1	38	52	83	87	A	112	140	200
Comparative Example 2									

TABLE 3

Examples	Carboxylic Acid- Containing Polymer	AC Layer			Content of		Univalent Ion		Compound (A)		Polyvalent Ion	
		Content			Inorganic Components [wt %]	Ion Type	Added Amount [mol %]	Compound (B) Type	Type	Added Amount [mol %] (*)	Ion Type	Neutral- ization Degree
		of Nitrogen (wt %)	Thick- ness [μm]	Layer Structure								
Example 14	PAA	7.9	0.1	Both Sides	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ²⁺	61
Example 15	PAA	7.9	0.2	Both Sides	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ²⁺	61
Example 16	PAA	4.4	0.1	Both Sides	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ²⁺	61
Example 17	PAA	7.2	0.1	Both Sides	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ²⁺	61
Example 18	PAA	4.9	0.1	Both Sides	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ²⁺	61
Example 19	PAA	4.9	0.1	One Side	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ²⁺	61
Example 20	PAA	4.9	0.1	One Side	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ²⁺	60
Example 21	PAA	7.2	0.1	Both Sides	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ^{2+*}	94
Example 22	PAA	7.2	0.1	Both Sides	30	NH ₄ ⁺	1.5	TMOS	a-1	10	Ca ²⁺	97
Comparative Example 3	PAA	7.2	0.1	Both Sides	30	NH ₄ ⁺	1.5	TMOS	a-1	10	(Na ⁺)	(63)

TABLE 4

Examples	Rate of Increase in	Oxygen Transmission Rate (cm ³ ·m ² ·			Oxygen Transmission		Surface			Dropped Bag	Tensile Strength and Elongation	
	Viscosity	(day · atm)			Rate after Retort	30	Surface	Appearance	Peel	Breaking	Strength (MPa)	Elongation (%)
	of Solution (S) (%)	65% RH	85% RH	95% RH	Processing (cm ³ ·m ² ·day · atm)	of Haze	Appearance	After Heating	Strength [μ/15 mm]	Strength (Times)		
Example 14	2	0.4	0.4	0.5	0.2>	0.63	AA	AA	576	126	140	210
Example 15	2	0.4	0.4	0.5	0.2>	0.60	AA	B	636	130	130	180
Example 16	2	0.4	0.4	0.5	0.2>	0.60	AA	A	556	110	130	220
Example 17	2	0.4	0.4	0.5	0.2>	2.40	A	A	250	78	140	220
Example 18	2	0.4	0.4	0.5	0.2>	0.30	AA	AA	560	125	120	190
Example 19	2	0.2>	0.2>	0.2>	0.2>	0.30	AA	AA	380	73	120	200
Example 20	2	0.2>	0.2>	0.2>	0.2>	0.30	AA	AA	360	81	110	200
Example 21	2	0.2>	0.2>	0.2>	0.2>	0.69	AA	B	576	52	120	220
Example 22	2	0.2>	0.2>	0.2>	0.2>	0.62	AA	AA	606	118	140	200
Comparative Example 3	2	84	87	89	87	0.59	AA	AA	596	116	140	190

Specifically, the gas barrier layered product of Examples 1-11 and 14-22, wherein *at least 55 mol%* of a -COO- group contained in the polymer has been *neutralized with a metal ion having a valence of two or more* in accordance with the claimed invention (See e.g., ion type and neutralization degree columns of Tables 1 and 3), exhibited a superior oxygen gas barrier property under high humidity conditions and after retort processing (See e.g., oxygen transmission rate columns of Tables 2 and 4), as compared to the inferior oxygen gas barrier property exhibited under high humidity conditions and after retort processing by the conventional gas barrier layered product of Examples 12 and 13 and Comparative Examples 1-3, wherein *at least 55 mol%* of a -COO- group contained in the polymer has *not* been *neutralized with a metal ion having a valence of two or more*.

Withdrawal of these grounds of rejection is respectfully requested.

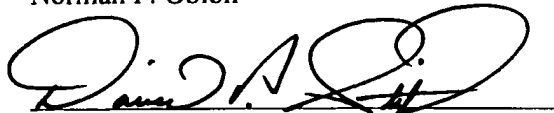
Applicants respectfully request that the provisional obviousness-type double patenting rejections of: (1) claims 1, 4-7, 16, 17, 22 and 23 over claims 1, 3-8, 10-17 and 19 of copending patent application number 11/909,562 (Oshita); and (2) claims 1-4, 6-16 and 22-29 over claims 1-16 of copending patent application number 11/916,371 (Uehara U.S. 2009/0030126), be held in abeyance, with respect to claims 1, 3, 5, 11, 12, 15-24 and 27-34, until allowable subject matter in the present application is indicated.

Applicants acknowledge that references AO (JP 2004-314563) and AP (JP 2003-191364) cited on the Information Disclosure Statement submitted June 1, 2006, have not been considered on the ground that an English translation of these documents has not been provided. Pursuant to MPEP § 609.04(a)(III), the English language equivalent of the International Search Report of International patent application PCT/JP2004/017874, which was submitted on June 1, 2006, indicates that these references have an "A" relevancy, thereby satisfying the requirements of 37 C.F.R. § 1.98(a)(3)(i). Applicants respectfully request that the Examiner acknowledge consideration of these references by providing Applicants with an initialed copy of the PTO-1449 Form submitted on June 1, 2006, at the Examiner's earliest convenience. A copy of this PTO-1449 Form is appended herewith for the Examiner's convenience.

In conclusion, Applicants submit that the present application is now in condition for allowance and notification to this effect is earnestly solicited.

Respectfully submitted,

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